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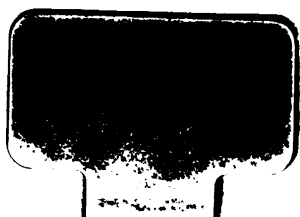
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HOMŒOPATHIC
INFINITESIMAL
DOSES.



**HOMŒOPATHIC
INFINITESIMAL DOSES.**



HOMŒOPATHIC INFINITESIMAL DOSES,

AND THEIR

ANALOGUES IN NATURE.

READ BEFORE

THE NORTHERN HOMŒOPATHIC MEDICAL SOCIETY AT YORK,

OCTOBER 9TH, 1863.

BY

JOHN RYAN, M.D., LL.D., &c.,

PRESIDENT OF THE SOCIETY.

"Medicamenta dividi possunt, in partes adéo minutas, ut imaginationis vim
pene eludant, quæ, tamen, retinebunt vires."

BORRHAAVE: *De viribus medicamentorum*, cap. 2.

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AND ALL HOMŒOPATHIC CHEMISTS.

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HOMŒOPATHIC INFINITESIMAL DOSES.

CHAPTER I.

THE term infinitesimal, in its sense of 'unmeasurable,' is used to designate those conditions of analysis in which an ingredient, although present, exists only in 'traces;' it is also applied to those preparations in which the active medicinal principle is beyond the reach of the physicist, and can only be detected by means of the physiological or vital test. In this sense, many of the homœopathic medicines are infinitesimal.

The term is also used, contemptuously, to indicate all homœopathic remedies, whatever their degrees of strength may be.

The follower of Hahnemann learns, by happy experience, how securely he may rely upon those physiological expressions of the entity of his medicines,

which are afforded by the relief of pain, or the restoration of health ; and he confidently invites others to determine, by the same method, the truth of his adopted system. His appeal is, however, too generally rejected by his brethren of the old school, because the 'prejudice of opinion' has already led them to the conviction that the employment of inappreciable, unmeasurable portions of any medicinal agent *must* be absurd and futile.

In cherishing such a foregone conclusion, the opponents of homœopathy are wrong—let that system be true or false.

When physical investigation fails to detect a drug in its material form, the homœopathist has a perfect right to appeal to the indications afforded by physiology ; the action of invisible imponderable forces, be they those of heat, light, electricity, miasmata, or infinitesimals, upon the organism, is as much a branch of legitimate philosophical inquiry as is the consideration of the influence of material visible masses, upon the same portions of the human frame.

The believer in the power of infinitesimals has arrived at the conviction that certain drugs possess therapeutic influence over special forms of disease ; and that this influence is in relation to the pathogenetic effects of the same drugs upon the healthy body. This conviction is the result of careful in-

ductive and deductive experimentation and reasoning. By the same methods of research, he has learned also that these medicines exert their curative force over the disease-symptoms, to which they are homœopathic, even when they are so divided and attenuated as to have passed beyond all physical appreciation. To condemn, therefore, such a system of healing, or to treat as an absurdity such a form of posology, without a previous examination of the processes of experimentation and of reasoning which have led the homœopathist to adopt them, is illogical and unfair.

That which Herschel has said in reference to physical inquiry, applies with equal force to physiological research. "Experience," remarked that distinguished philosopher, "once recognised as the fountain of all our knowledge of nature and its laws, we ought at once to make up our minds to dismiss as idle prejudices, or, at least, to suspend as premature, any preconceived notion of what might or what ought to be the order of nature in any proposed case, and content ourselves with observing, as a plain matter of fact, what *is*. To experience we refer as the only ground of all physical inquiry. But before experience itself can be used with advantage, there is one preliminary step to make, which depends wholly upon ourselves; it is the absolute dismissal and cleansing the mind of all prejudice, from whatever

source arising, and the determination to stand an fall by the result of a direct [appeal to facts, in the first instance, and of strict logical deduction from them afterwards."*

The doctrine of infinitesimals has doubtless been the main obstacle to the investigation of the homœopathic law of healing. It is the 'spot,' the 'devil's-mark' into which the quack-finder drives his needle, and its presence is the evidence upon which he pronounces the condemnation of the whole system.

Yet, what could be fairer than a course of experimentation as to the value of the medicine of homœopathy? It is not sufficient that we should condemn an *untried* or *unexplained* matter, because it *appears* absurd, or impossible. "Let a man be told, for the first time, that a gnat's wing, in its ordinary flight, beats many hundred times in a second; that every point of a medium through which a ray of light passes, is affected with a succession of periodical movements regularly recurring, at equal intervals, no less than five hundred millions of millions of times in a single second; that it is, by such movements communicated to the nerves of the eye, that we see, nay more, that it is the *difference* in the frequency of their recurrence which affects us with the sense of the diversity of colour; that, for instance, in ac-

* 'Discourse on the Study of Natural Philosophy.'

quiring the sensation of redness, our eyes are affected five hundred and eighty-two millions of millions of times; of yellowness, five hundred and forty-two millions of millions of times; and, of violet, seven hundred and seven millions of millions of times per second; let a man be told, we repeat, for the first time, these astounding facts, and he will probably regard them as more like the ravings of madmen than the sober conclusions of people in their waking senses. They are, nevertheless, conclusions to which any man may, most certainly arrive, who will only be at the trouble of examining the chain of reasoning by which they have been obtained.”*

The doctrine of the therapeutic power of unmeasurable doses of medicine may, in the first instance, seem absurd and quackish; but *that* which abstract science can do towards the demonstration of the phenomena to which Herschel refers, physiology can accomplish in proof of the curative efficacy of infinitesimals.†

* Herschel's 'Discourse.'

† A course of experimentation, to be carried out fairly and satisfactorily, involves a strict compliance with the law of *similars* in the choice of the remedy.

In 1834, M. Andral undertook to test the truth of homœopathy in the hospital of La Pitie; and the result is often quoted by the allopathic press, as conclusive evidence against the system of small doses. The cause of M. Andral's failure is not to be found in homœopathy, but, in his ignorance of the science. M.

Andral has himself, since then, expressed his dissatisfaction with the mode in which the test was applied, (*Bulletin de Thérapeutique*, vol. vii, p. 14, 15); and his interne, M. Maxime Vernois, now member of the *Académie*, who had assisted him in his investigation, has admitted, in a pamphlet, the incapacity of his chief to perform homœopathic experiments, from his not knowing the action of the medicines; and excuses his ignorance by saying it was unavoidable (*ignorance obligée*).

M. Andral was unable, at that time, to increase his acquaintance with the science of homœopathy. He could not consult Hahnemann's *Materia Medica* in the original, because he had no knowledge of German; no French translation had then appeared, and an acquaintance with English was as yet equally useless to the student. A perusal of the recorded cases shows that, in nearly every instance, the medicine was not well chosen; and although many were chronic cases requiring a *course* of treatment, yet M. Andral contented himself by giving only one dose in each instance.—(*Dr. Irvine*).

CHAPTER II.

THERE are two leading objections which the opponents of homœopathy constantly urge against its *Materia Medica*, viz. :

I. That the homœopathic preparations really contain no medicine whatever ; all traces of the original drug being lost, in the process of attenuation.

II. That even if the preparations do contain traces of the original drug, the employment of such infinitesimal doses is inconsistent with the principles of science.

The first objection involves merely a question of the limits of the divisibility of matter, and may be met by a reference to physical, and physiological facts ; I say, “physical and physiological facts,” because, although the physicist can trace the drug to a point of attenuation which seems perfectly marvellous, yet, the physiologist can pass far beyond.

In the Smethurst poisoning case, Dr. A. S. Taylor declared that the homœopathic globules, submitted to his examination, contained no medicine whatever,

because he, by chemical reagents, could discover nothing in them except sugar, starch, and gum. Dr. Sharp, of Rugby, exposed, at the time, the fallacy of such reasoning. In his letter to Dr. Taylor, he observes:—"It would be as sound reasoning, if, on analysing two bars of iron, one being a magnet, the other not, and finding no chemical difference between them, you were, therefore, to deny all the facts of *magnetism*, connected with the magnetised bar. It would be as consistent, were I to request you to allow yourself to be bitten by a rattlesnake, or a cobra di capello, contending, that you could not possibly take any harm from its deadly poison, for that this had been carefully analysed, and nothing could be detected in it, chemically, but gum and water."*

We have no evidence of the senses, that, in the process of experimentation, the philosopher has ever arrived at the limits of matter's divisibility. The failure of the physicist to detect the presence of a drug, is no conclusive proof of its absence; the physiological or vital test still remains to be applied. A single grain of musk perfumes a large room, for the space of twenty years, and, during that time, must be divided into, at least, three hundred and twenty

* 'Homœopathic Review,' vol. iii, p. 363.

quadrillion parts.* The quadrillionth of a grain of musk is far beyond the reach of physical research :—but, as that quantity is capable of acting upon the olfactory nerves, its presence can be proved by its physiological effects :—so, may particles of a drug, so attenuated as to be infinitesimal, still have an influence over the human organism. As, however, the opponent of homœopathy refuses, in most instances, to apply the physiological test to infinitesimal medicines, deeming it an absurdity to do so, the advocate of the system feels anxious to find arguments, if possible, that will not shock his prejudices. It is with such an object that I am now about to appeal to the records of physical science, to show that there is nothing unphilosophical in the belief that drug-matter may reach even the highest attenuations of the homœopathic pharmacopœia, and, yet, retain its therapeutic force.

Flax has been spun, so fine, that one pound weight of its yarn would extend to a distance of 1432 English miles. A portion, weighing not more than the 127,080,000th part of a grain, is distinctly visible; yet that fragment is made up of fibres, each containing its inorganic constituents, carbonate, phosphate, and sulphate of lime, oxide of iron, carbonate of magnesia, chloride of sodium, and silica. The chemist

* 'Elements of Med. Chem.,' by Dr. Paris.

would seek in vain for those compounds; but, they are nevertheless present.

One tenth of a grain of green vitriol does not contain quite one fiftieth of a grain of iron. If we dissolve one tenth of a grain of this salt, in seventy thousand grains of water, the presence of the iron may be rendered apparent by the addition of a little tincture of galls;—that is, it may be proved to the eye, that each grain of water contains the seventy thousandth of the fiftieth of a grain of the metal:—“a quantity,” remarks Professor Daniell, “far too minute to be ascertained by the most delicate instruments; and of which our imagination itself cannot possibly form an accurate conception;—and yet we dare not assert that this inconceivably minute quantity bears any assignable proportion to the weight of a primitive particle.”*

If, instead of dissolving one tenth of a grain of green vitriol in seventy thousand grains of water, we place that quantity in ten times that amount of fluid, the gall-test will fail to reveal the presence of the iron;—but, it must be there, diffused, attenuated, infinitesimalized, lost to the physicist—but not destroyed.

The existence of matter, in a material form, yet far beyond the range of physical detection, may be

* ‘Introduction to Chemical Philosophy.’

exemplified by a reference to animalcules. Millions of such creatures, moving within a limited space, but not absolutely in contact with each other, would be perfectly invisible to the eye,—in some cases, even when assisted by the most powerful instruments yet invented;—but if some agency would pile these millions into a close mass, then, even the unassisted vision would recognise a heap of living, moving bodies. Were it possible, once more, to separate that living heap into individuals, each animal would no longer exist within the range of our senses, yet, each would possess the same life, the same love of life, the same wonderful mechanism, which heretofore distinguished it, as a part of a living, moving, visible mass. In separating such a crowd into individuals, we recognise merely a process of division, not of destruction.*

A fragment of silver wire, only 0·01 of a cubic line, in size, dissolved in nitric acid, will render distinctly

* “We are acquainted with animals possessing teeth, and organs of motion and digestion, which are wholly invisible to the naked eye. Other animals exist, which, when measured, are found to be many thousands of times smaller, and which, nevertheless, possess the same apparatus. These creatures, in the same manner as the larger animals, take nourishment, and are propagated by means of ova, which must, consequently, be again many hundreds of times smaller than their own bodies. It is only because our organs of vision are imperfect that we do not perceive creatures *a million of times smaller than these*.”
—*Liebig's Letters on Chemistry*.

milky, 500 cubic inches of a clear solution of common salt. Hence, the magnitude of each particle of silver cannot exceed, but must rather fall short of, a billionth of a cubic line.

Referring to this instance of the divisibility of matter, Sir Robert Kane observes:—"To render the idea of this degree of division more distinct than the mere mention of so imperfectly conceivable a number as a *billion* could effect, it may be added, that a man to reckon, with a watch, counting day and night, a single billion of seconds, would require 31,675 years."*

A grain of copper, treated, first by nitric acid, and then by ammonia, colours, distinctly, 392 cubic inches of water. If we suppose that each portion of water not larger than a grain of sand, of which there are more than a million in every cubic inch, contains only one particle of copper, a supposition very far below the reality, the single grain of the metal must have been divided into 392 million parts.

In a drop of a strong solution of indigo, no less than 500,000 distinct portions of the dye may be seen. That single drop can impart colour to a thousand cubic inches of water; and, as this mass contains certainly 500,000 times the bulk of the drop

* 'Elements of Chemistry.'

of indigo-solution, the particle of indigo must be smaller than the 2500 millionth of a cubic inch.

In gilding silver wire, one grain of gold is spread over a surface of 1400 square inches; and, as when examined in a microscope, the gold upon the 1000th of a linear inch, or the millionth of a square inch, is distinctly visible, it is proved that gold may be divided into particles of, at least, the fourteen hundred millionth of a square inch, in size,— and yet possess the colour, and all the characteristics of the largest mass.

In all experiments, where the eye is aided by the microscope, the appreciable divisibility of matter is dependent upon the perfection of the apparatus. Since the experiments to which I have referred first found their place amongst our scientific records, great improvements have been made in optical instruments; and, now, for instance, a square inch can be divided, not merely into a million, but 900,000,000 parts, appreciable to the microscope; therefore, a grain of gold can be proved to be divisible into portions not exceeding the 1,260,000,000,000th of a square inch in size.

If a grain of nitrate of lead be dissolved in 500,000 grains of water, and a current of sulphuretted hydrogen be passed through the solution, the whole mass of liquid becomes sensibly coloured by the newly

formed sulphide of lead. Now, one grain of water equals one drop, and this, when spread out, can cover a square inch of surface. With an ordinary microscope, it is possible to distinguish the millionth part of a square inch. The water can, therefore be divided into 500,000,000,000 parts. The lead, contained in a grain of sulphide of lead, equals 0·87 of a grain; the sulphur 0·13 of a grain; therefore, an atom of lead cannot weigh more than the 6,000,000,000,000th of a grain; whilst the sulphur, combined with it, ought not to weigh more than the 3,000,000,000,000th of a grain.*

Since this calculation was first recorded, we repeat that the instruments of the optician have been much improved, and, instead of a millionth of a square inch being visible, 900,000,000 parts of the same surface are appreciable; therefore, the 500,000 grains of water, holding the sulphide of lead, can be divided, not into 500,000,000,000 parts, only, but into no less than 45,000,000,000,000,000; and, the portion of sulphur, will represent the 3,000,000,000,000,000 of a grain. Yet, who shall dare to say that this bears any assignable proportion to the weight of a primitive atom?†

* 'An inquiry into the nature of the simple bodies of Chemistry.' By David Low.

† "J'ai vu dans les ateliers de notre célèbre fabricant, et physicien Froment, le millimetre divisé en mille parties, par-

We might pass, now, into the domain of the spectroscopist, and adduce still further examples of the vast divisibility of matter;—but, why multiply instances? Who shall detect the limit of its attenuation, or define the size and weight of its ultimate particle?

“Matter,” said the illustrious Cuvier, “is only the depository of force: matter passes away, but force remains.” And, Sir William Armstrong, in the same spirit, observed, in his inaugural address the other day at Newcastle, “Whatever our views may be of the nature of particles, we must conceive them as centres, invested with surrounding forces. We have no evidence, either from our senses, or otherwise, of those centres being occupied by solid cores of indivisible, incompressible matter, essentially distinct from force. Dr. Young has shown, that even in so dense a body as water, these nuclei, if they exist at all, must be so small in relation to the intervening spaces, that a hundred men, distributed at equal distance over the whole surface of England, would

faiblement appreciable du microscope. Or, une goutte d'eau peut couvrir trois centimètres carrés (qui ne font guère plus d'un pouce), et représente ainsi, 30,000 parties en longueur, qui élevées au carré, pour exprimer la surface, donnent non plus un million, mais, 900,000,000 (900 millions) de parties, visibles à l'œil nu, dans 3 centimètres carrés.”—*Dr. Ozanam in 'L'Art Medical,' Janvier, 1862.*

represent their relative magnitude, and distance. What, then, must be their relative dimensions, in highly rarified matter? But, why encumber our conceptions of natural forces, by the unnecessary imagining of a central molecule? If we retain the forces, and reject the molecule, we shall, still, have every property we can recognise, in matter, by the use of our senses, or by the aid of reason. Viewed in this light, matter is not merely a thing subject to force, but is, itself, composed and constituted of force." So, also, in the same spirit, did the distinguished allopathic physician, Récamier, declare:—"It is to imponderable principles, alone, that each medicine owes its manner of action, its power, its efficacy—each medicine being a special conductor of imponderable principles."

CHAPTER III.

WE come, now, to the second objection to the homœopathic *Materia Medica* ; viz., “ that even if the preparations do contain traces of the original drug, the employment of such infinitesimal doses is inconsistent with the principles of science.”

Physiological changes, whether in the direction of health or disease, MUST be in accordance with natural laws, and therefore in unison with the principles of science.

The records of homœopathic practice are full of instances of physiological changes in the human organism, from disease to health ; such changes being, we believe, the results of the curative power of unmeasurable doses ; but as the opponent of homœopathy may refuse to admit such evidence, I shall endeavour to meet the objection to the scientific status of infinitesimals by an appeal :

1. To the testimony of allopathic authorities.
2. To the evidence afforded by certain natural phenomena.

Dr. Watson, the President of the College of Physicians, gives the following highly suggestive evidence in favour of the remedial power of *small doses* of specific medicines. Speaking of quinine, he remarks, "I think it not improbable that my patients would have been cured quite as soon if I had given the remedy in half its strength. Dr. Barker, of Dublin, has found *small doses equally effective with large ones*; and this is very likely to be the case with all specific medicines."*

Much of the ridicule which is aimed at the doctrine of infinitesimals is the result of a silly misunderstanding of the science of homœopathy. The follower of Hahnemann never dreams of producing *allopathic* effects by means of unmeasurable quantities of a drug; he seeks to obtain only the specific action of a medicine. Philosophers, like Drs. Watson and Barker, can comprehend the possibility of reducing the quantity of certain remedies, without destroying their influence; but they are compelled to confine themselves to those whose action is specific. If it were objected to Dr. Watson, that his observation on small doses was absurd and unscientific, and opposed to experience, inasmuch as small quantities of purgative or emetic drugs were not as effectual as large ones, we should be told that to *purge* or to *vomit* is not the *specific*

* 'Principles and Practice of Physic.'

curative effect of any medicine, and that purging and vomiting are notoriously dependent upon quantity; yet the objection to the small dose of the homœopathist is often based upon the same grounds, and may be met in the same general terms.*

"The aim of homœopathy," said the celebrated Hufeland, "is to find specifics for individual forms of disease;" and Hahnemann, repudiating the notion that there are such things as specifics for diseases in their entirety, declares his belief that there are as many specifics as there are symptoms of individual diseases.

A specific, in the homœopathic sense of the term, and I believe the same may be said of all specifics whatever, has an action upon the same parts of the organism, both in health and in disease. The morbid symptoms, also, which the drug produces in a pre-

* "I remember," said Bacon, "a famous Jew physician in England, would say: 'Your European physicians are indeed men of learning, but they know nothing of particular cures for diseases.' And he would sometimes jest, a little innocently, and say, 'Our physicians were like bishops, that had the keys of *binding* and *loosing*, and no more.'"—(*Advancement of Learning*, Book iv, chap. 2.)

The practice of the old school is so connected with *binding* and *loosing*, that when an ignorant man hears of infinitesimals, he associates them at once in his own mind, with such effects; and his common sense is offended by the absurdity. Too many medical men, also, either fall into the same mistake, or wilfully encourage it in others, for the purpose of rendering homœopathy ridiculous.

viously healthy organism, always resemble those for which it is specifically curative, in the same parts rendered morbid by natural causes. Thus, arsenic, in certain doses, acting on the healthy body, sets up painful purging, vomiting, &c. ; but over an organism suffering from similar symptoms resulting from natural disease, it has, in small doses, a specific curative power. Hence, large doses of specific medicines are not only unnecessary, but absolutely dangerous.

Dr. Pereira gives an excellent illustration of the action of a specific, in the homœopathic sense, in the following remarks on *iodine*: "In chronic inflammation, induration, and enlargement of the *liver*, after antiphlogistic measures have been adopted, the two most important and probable means of relief, are *iodine* and *mercury*, which may be used either separately or conjointly. If the disease admit of a cure, these are the agents most likely to effect it. Iodine, indeed, has been supposed to possess some *specific* power of influencing the liver, not only from its efficacy in alleviating or curing certain diseases of this organ, but also from the effects of an *overdose*. In one case, pain and *induration* of the liver were brought on; and, in another, which terminated fatally, this organ was found to be enlarged, and of a pale rose colour."*

* Dr. Christison (*Treatise on Poisons*) quotes a case of poison-

I refer to these remarks of an allopathic writer, because I do think that they supply some important arguments in favour of the administration of specifics, in doses at least small enough to prevent the aggravation of the symptoms to which they are evidently homœopathic.

"*It may be stated generally,*" observes Dr. A. S. Taylor, "*that medicine in a large dose is a poison, and a poison in a small dose, is a medicine.*"* This remark of the celebrated toxicologist has a signification powerfully favorable to the small dose of homœopathy; for he had just before been explaining that tartar emetic, in large doses, produces vomiting and purging—its poisonous effects—but that, in small doses, it cures like conditions when resulting from natural causes. I need not say how apt an illustration this is of the homœopathic law.

Dr. Taylor's enunciation of the aphorism that medicine in a large dose is a poison, and a poison in a small dose is a medicine, places him, as an opponent of homœopathy, in rather an awkward predicament; as, in the same work from which we have

ing by iodine, described in 'Rust's Journal.' Among the symptoms were, pain in the region of the liver, &c.; and Dr. Christison remarks: "From this case, and another of which the appearances after death will be presently noticed, *it is not improbable that iodine possesses the power of inflaming the liver.*"

* 'Guy's Hospital Reports,' Third series, p. 381.

just quoted,* after referring to the pathogenetic effects produced on Dr. Mayerhöfer, of Munich, by the *one hundredth of a grain* of tartar emetic, he adds, "The reader will not be surprised at the powerful effects obtained from so small a quantity of medicine, when he considers other well-known facts in toxicology. The quantity of carbonate of lead which produces lead colic and paralysis, in workmen in white-lead factories, is not appreciable."

According to Dr. Taylor, then, a drug has two actions; one poisonous, the other curative; curative too, of conditions or symptoms, *like* those which, as a poison, it could induce in the same parts of the human body. These different actions of the drug, according to the same authority, are dependent on quantity. He has shown us that *one hundredth of a grain* of tartar emetic produced pathogenetic effects; how small, then, should be its curative dose? The quantity of carbonate of lead which destroys health, he tells us, is not appreciable; how small, then, is its curative proportion?

In fact, Dr. Taylor unwittingly establishes the scientific character of the small dose of homœopathy. Thus the follower of Hahnemann, in his treatment of disease, selects a drug that, in the healthy body, in large or long-continued doses, can set up symptoms

* 'Guy's Hospital Reports,' Third series, p. 387.

resembling those under which his patient is suffering ; the purging and vomiting of tartar emetic, and its cure of like symptoms resulting from natural disease, are illustrations ; it is, therefore, in accordance with scientific principles, that in order to cure disease-symptoms similar to those which the drug can create, we must give that substance in quantities much smaller than those which constitute it a poison. This is the very essence of homœopathy, and a proof of the just claims of the small-dose to a scientific status.

It may, therefore, be affirmed that the pathogenetic or poisonous effect of a drug depends upon the sum of the dose ; but that specific remedial force is independent of quantity, and must be present in the smallest conceivable part.

Boerhaave, who would not speak lightly or without careful experiment, says, in one of his most celebrated works, "Medicines can be divided into parts so minute as almost to elude the power of imagination ; and yet they will retain their power."

Hufeland, referring to Hahnemann's method of employing belladonna as a preventive of scarlatina, observes : "To be prejudiced against the remedy, merely on account of the smallness of the dose, would be to forget that it is here a question of a *dynamic* effect, that is to say, an effect produced in the living

subject, and which cannot be calculated either by books or grains." Pereira, in allusion to "the 'dynamic effect' of a medicine," says, "In the inorganic kingdom we have evidence of an influence which cannot be denominated either mechanical or chemical. The communication of magnetical and chemical properties to iron, by mere contact with another body, without the production of any change of form or composition, either of the iron or the imparting body, is an example of this. Now to influences of this kind, the term *dynamical* has been applied; and several pharmacologists have employed it to indicate those influences of medicines over the organism, which are ascribable to neither mechanical nor chemical causes."*

Whether dynamism only *resembles* that influence to which Pereira refers, or whether it be, indeed, electrical force, as Bischoff and others believe,† we need not stop to enquire. In either case we have arguments supplied by high allopathic authorities, in favour of the influence of invisible and imponderous quantities of matter; for where is the limit of that dynamic force, which is either identical with, or can even be typified by electricity? If a bar of iron be heated at one end, and be kept cool at the other, an electric

* 'Elements of Materia Medica.'

† 'Der Lehre von den Chemischen Heilmittein.'

current circulates through the mass, and may be carried off by connection with a good conductor, and may be accurately measured. This is a phenomenon easily made manifest; it is a *great dose* fact in electricity; but there are, also, *small dose* facts as well; for it is also true that if the warm hand alone be placed on one end of the mightiest piece of iron ever cast, the same kind of electrical action will be set up, and similar currents will circulate through the metal.

CHAPTER IV.

It is worthy of remark that while the majority of the medical profession has denounced the doctrine of unmeasurable doses, as too absurd even for experiment; or, while here and there, scientific men, like Watson, Barker, Taylor, and Pereira, have inadvertently adduced facts which the homœopathist can legitimately appropriate,—there have been, among the highest in the schools of philosophy, those who, without giving in their adhesion to homœopathy as a system of practice,—being unable to shut their eyes to the fact of its successful operation,—have endeavoured, by a reference to scientific data, to demonstrate the possible action of infinitesimals. It is true that some of these theories may not be such as the followers of Hahnemann would agree to adopt; all the explanations of the *modus operandi* of the small dose may not be correct; yet, the existence of such theories, built up in accordance with the laws of philosophic reasoning, is a proof that the doctrine of infinitesimals is not inconsistent with the principles of science.*

* It is not rare for natural phenomena to have more than one scientific theory or interpretation attached to them—take *light* as an example.

In 1830, Dr. Daubeny, Professor of Chemistry in the University of Oxford, read a paper before the Royal Society, "*On the Saline and Purgative Springs of Great Britain*," in which he expressed his doubt of the possibility of any medicinal action being exercised by the small quantities of iodine found in some of the waters. In 1831, however, he announced that he was now induced "to attach more importance to the circumstance of its presence, for it is just as possible, *à priori*, that this quantity of iodine should infuse new properties into the salts which accompany it, and cause them to act in a different manner upon the system, as that less than a millionth part of potassium should create so entire a change in the relations of a mass of mercury to electricity."

Dr. Daubeny here refers to an experiment of Sir John Herschel, which demonstrates that the relation of electricity to a mass of mercury is such, that it may be reversed by the admixture of an infinitesimal proportion of a body such as potassium, in an opposite electric state.*

* An example of the manifestation of great forces by minute portions of matter, is seen in Longmaid's method of improving steel. The 'Mining Journal,' August 17th, 1861, tells us that "it has been found that the addition of several pounds weight of gold or platinum to the ton of steel, failed in producing any beneficial results; but Mr. Longmaid has discovered that by

The largest quantity of iodine found by Dr. Daubeny in the springs which he had examined, did not exceed the proportion of one grain to seven hundred thousand grains of water. Impressed, however, by the proofs of the undoubted medicinal effects of so small a quantity of the drug, his philosophic mind sought for some theory to account for the fact; and having found one to his own satisfaction, and one which satisfied the requirements of scientific reasoning, he observed: "It is not unlikely that the system of the homœopathists of Germany may have grown out of some facts that had been observed, with respect to the powerful influence exerted on the system, when even very minute quantities of certain active principles were added to common medicines."

The science of chemistry affords numerous examples of the powerful influence exerted by very minute portions of matter in changing the condition of bodies. This is evident, not only in organized and living bodies, but also, as in the case of the metals mercury and potassium, among inorganic substances as well.

Important changes frequently take place that seem adding, instead of several pounds; only a few ounces, or even *dwt.s.* of the precious metal to a ton of steel, the effect is marvellous, and a very excellent quality of metal is produced." When preparing metal for ordinary casting, Mr. Longmaid employs at the rate of $\frac{1}{4}$ ounce of gold or platinum, or the two together, to a *ton* of cast iron.

to have no relation to the ordinary phenomena of affinity: thus, when hydrogen and oxygen are mechanically mixed together, and brought into contact with a slip of clean platinum, they gradually unite, and form water. When starch is boiled in diluted sulphuric acid, it is converted into dextrine, gum, starch-sugar, and finally, crystallizable grape-sugar. At the termination of the process, the sulphuric acid is found *unchanged* in properties and quantity; so that the *smallest proportion* of acid is sufficient to saccharize any amount of starch. Oxamide ($C_2O_2NH_2$) diffused through water, in which there is the minutest proportion of oxalic acid, gradually disappears, and taking to itself the elements of an equivalent of water, is converted into neutral oxalate of ammonia ($C_2O_3 + NH_3$); and the small quantity of original oxalic acid remains unaltered.

If a solution of sugar ($C_{12}H_{11}O_{11}$) be brought in contact with a little decomposing gluten, or yeast, it unites with the elements of an equivalent of water, and divides itself into two equivalents of alcohol $2(C_4H_6O_2)$, and four of carbonic acid $4(CO_2)$. If a solution of urea ($CONH_2$) be put in contact with yeast, it unites also, with an atom of water, and is then decomposed into ammonia (NH_3) and carbonic acid. The conversion of starch into sugar, in the processes of germination and of malting, is effected by the sub-

stance diastase, which accompanies the starch in the grain.

In the animal system we have also numerous examples of like changes by contact, as distinguished from chemical affinity. The blood of over-driven cattle produces effects similar to those of venomous reptiles ; and the wounds received in dissection are sometimes followed by fatal consequences. The small quantity of diseased organic matter originally introduced into the system by absorption, acts as a ferment, and reproduces itself in the mass of the blood, until it becomes unfitted for its functions, and the animal dies. In this way, also, miasma and malaria act as ferments in the blood, and produce dangerous diseases.

So, also, if the theory of merorganization propounded by Dr. Prout be correct, we have examples of most important distinctions, in organized bodies, being dependent upon an infinitesimal difference in the amount of some foreign ingredient. Thus, starch, gum, the varieties of cane and grape-sugar, differ from each other only in consequence of the difference in the amount of an already unmeasurable quantity of an inorganic substance.

Dr. Prout observes :—“ It has been known from the very infancy of chemistry that all organized bodies, besides the elements of which they are essentially composed, contain minute quantities of different foreign

bodies, such as the earthy and alkaline salts, iron, &c. These have usually been considered as mere mechanical mixtures, accidentally present; but I can by no means subscribe to this opinion. * * * Thus, starch, I consider as *merorganized* sugar, the two substances having the same essential composition, but the starch differing from the sugar by containing minute portions of other matters."

In a discussion which took place a few years ago, in the French Academy,* in reference to M. Labourdette's plan of administering medicines through the milk of animals, M. Boudet, "while admiring the persevering efforts of M. Labourdette, could not admit that the results promised to prove of much practical utility. The small quantity of iodine, for example, that could thus be communicated to the milk rendered this fluid far inferior, in this respect, to cod-liver oil. To act therapeutically, very large quantities of the milk diet would be required, which might be ill-supported, or in other respects objectionable." M. Trousseau, the celebrated French physician, met this objection, by stating: "He did not believe that the quantity of a substance administered constituted all its consequence. Thus, for example, in the treatment of chloro-anæmia by iron, it was long believed that

* 'Bulletin de l'Académie,' tome xxiv, p. 746.

the iron was only of efficacy when it gained a bodily entrance into the blood, to supply the deficient colouring matter. This theory of the action of iron is now pretty generally abandoned. It is admitted that it acts, to a certain extent, by modifying the functions, especially operating on the assimilating functions in such a manner, that small portions of iron may be absorbed and utilised, independently of the quantity that has been administered; *i. e.*, that the assimilation operates just as well upon the iron introduced by the aliments, as upon that which may be given in large doses. What has been said of iron may be repeated concerning other medicinal substances, to which purely dynamic action is very generally attributable."

Although I wish to confine myself, as much as possible, to a review of the opinions of allopathic authorities on the subject of infinitesimals; yet it will not be irrelevant to place in juxtaposition with the views of M. Trousseau, those of a distinguished homœopathic physician, Dr. B. F. Joslin. In a paper which appeared in the 'American Homœopathic Review,' October, 1859, Dr. Joslin remarks: "To many intelligent persons it appears incredible that minute doses of our preparations can have any sensible effect in cases where they are of the same chemical nature with elements of our blood, of our food, and

even of the water in which the medicine is dissolved and administered.

“Now, it is a fact established by abundant experience, that each of these substances *does* evince its specific properties, both by producing a certain set of symptoms in different healthy individuals, and in manifesting a decided curative agency, in diseases to which they are appropriate. However we may fail to explain these results, such facts can never be set aside by our inability to give a satisfactory interpretation. Those who have repeatedly felt and observed the effects, will believe; those who have *not*, will require a reason to induce them to subject the matter to the test of experiment.

“It is said, if the blood is deficient in iron, as is the case in chlorosis, affecting pallid young females, with delayed menstruation, how can an infinitesimal supply of iron produce any sensible augmentation of the vastly greater quantity already existing in the blood, even of those chlorotic patients?

“This objection originates in a total misconception of the principle on which the medicine appropriate to such cases operates. The object of any truly scientific physician will not be to offer to the system the deficient material, but to enable it to appropriate that which is presented to it in the food; for, this malady rarely arises from any deficiency of iron in the

aliment, and never if the nutriment be properly selected. The power of digesting, assimilating and forming the food into blood is defective; and it is this power which is to be restored by medicine. The physician who is ignorant of this, and in treating such a case regards himself as a mere caterer for supplying materials, will naturally conclude that he must administer ferruginous medicine, and that the medicine must be given, at least, in quantities appreciable by chemical tests.

“Neither of these conclusions has the slightest foundation in reason. The substance which suitably regulates the vital forces, in this case, will not necessarily, or even generally, be iron, but some medicine indicated by the generality of the symptoms present. Again, the immediate object not being chemical, but vital, it is not necessary nor desirable, to employ a dose appreciable to chemical tests, but to the vital test, which is inconceivably more delicate. The living body can be strongly and durably affected by a dilution, which if concentrated a *billion-fold*, would not produce a visible change in any lifeless reagent.”

In 1837, Döppler, Professor of Mathematics, at Prague, published in Baumgartner's and Holger's 'Journal of Physics,' an essay "Of that which is great and small in Nature;" in which he endeavours to

supply a theory of the action of infinitesimal doses. Speaking of Professor Döppler, the late Dr. Samuel Brown says: He is not a physician, nor yet an homœopathic partisan, but simply brings the light of a certain physical distinction to bear on the question at issue ; being ready neither to oppose the prevailing school of medicine, nor to abet the followers of Hahnemann ; but having been disturbed and probably vexed by the uncharitable fight around him, he is willing to say whatever his own communication with science, elsewhere than in medicine, might enable him to advance to the point.”*

In his paper, the professor propounds the theory that the operation of a drug is not in relation to mere weight, but to surface ; and shows that in the process of trituration and admixture with a suitable vehicle, masses of solid matter are broken down, so that the effective surface is wonderfully increased. Thus, a cubic inch of any solid substance when pulverised until its particles are the size of grains of sand, of which there are at least a million in a cubic inch, has its effective surface increased to six or seven square feet. If these coarse grains be further triturated until they are as fine as the particles of dust floating in the atmosphere, the surface will have been increased, at least, to an area of a thousand feet. Still

* ‘ Theory of Small Doses.’

further, and further, may the trituration be carried on, the interstitial spaces being filled up with milk-sugar, until the surface becomes inconceivably extended. Therefore, according to the theory of Döppler, if surface be the seat of medicinal force, the homœopathist, with his small dose, may be giving an amount of effective physic far larger than that contained in the ponderous dose of the allopathist.

Döppler's views are so far valuable that they afford evidence of the fact, that a philosopher accustomed to close mathematical investigation, saw nothing in the doctrine of infinitesimals irreconcilable with scientific principles.

The experiments of Mayerhöfer seem to confirm the views of Döppler. Mayerhöfer believes that the process of trituration is a development of the medicinal powers of a drug, and that this is always accompanied by an excitation of electricity. He has found in one grain of tin, of the third trituration, no less than 115,200,000 divided, and still further divisible parts. According to his experiments, a grain of precipitated tin can be divided physically into a quadrillion parts; precipitated copper, platina, silver, gold, into more than a trillion parts; mercury into a billion; tin and copper-foil into more than a billion; filed or lead-foil, and filed iron, into a billion; coarse tin-foil, silver-foil, and gold, into a million. In these triturations, the diame-

ters of the metallic atoms vary from $\frac{1}{12000}$ th to $\frac{1}{20000}$ th of a cubic line; and are, therefore, at least sixty-four times smaller than the blood-globules of the human subject.

Mayerhöfer expresses a firm conviction that but for the imperfection of our instruments, *minima* might be traced in the highest dilutions of the homœopathist.

“The microscope,” remarks Dr. Addison, “has proved that all therapeutic operations are accomplished through the medium of a nucleated cell-growth :”* and again, the same distinguished physician observes :† “The problem of cure seems to consist in selecting a medicine which shall prove remedial, by stopping the abnormal cell-growth before producing an injurious influence upon any of the natural organs. If experience prove that mercury will check the progress of a natural cell-growth, before producing salivation, surely we may interpret the medical, by the physiological fact.”

These suggestive remarks of a distinguished medical philosopher, present to the homœopathist most powerful arguments in favour of the small-dose; nor do they speak less earnestly of the vast importance of that infinitesimal attenuation to which homœopathic

* ‘Cell Therapeutics.’

† ‘Healthy and Diseased Structures.’

medicines are brought by repeated triturations. According to Dr. Addison we require a medicine which, by virtue of affinity, shall seek the diseased cell, and stop the abnormal growth; but to reach that part, easily and readily, and without producing an injurious influence upon any of the natural organs, the remedy must be so attenuated as to pass the infinitesimal capillaries; that is, its particles must be less than the $\frac{1}{40000}$ of an inch in diameter.

The German pathologist, Virchow,* in one of his works,† gives the following remarkable evidence in favour of infinitesimals: "A minimum of a very energetic inciter may possess very great, and lasting effects, since, the primary catalytical action may be propagated further, and further. *This is one of the facts which demonstrate the possibility of so-called homœopathic effects.* Yes, and this catalytical action takes place, the more intensely, the greater the specific relation existing between the remedy and the organism, or any of its parts; so that, it is actually this propor-

* Rudolf Virchow, public professor in ordinary of Pathological Anatomy, &c., in the University of Berlin. Virchow's 'Cellular Pathology' has recently been translated into English by Frank Chance, B.A., M.B., Cantab., Physician to the Blenheim Dispensary, &c.

† 'Gesammelte Abhandlungen zur Wissenschaftlichen Medicin.'

tion which determines the degree of irritation ; and the remedy which is homœopathically indicated is, also, the strongest—*i. e.*, causes the most powerful stimulations. In this proportion, however, the one factor is represented by the *inciter*—whereas the second, greater, and more important one, is represented by the susceptibility of the organism towards the former.”

Another distinguished pathologist, the late Dr. John Fletcher, although at issue with Hahnemann and many of his disciples, as to the *modus operandi* of infinitesimals, found no difficulty in reconciling the action of such unmeasurable doses with the requirements of science. After giving a number of examples of the homœopathic action of medicines, *i. e.*, of purgatives in diarrhœa ; aloe in piles ; cantharides, turpentine, and balsams, in gleet, and catarrh of the bladder ; tartar emetic, in diaphoresis ; cinchona, in intermittent fever ; tartar emetic, in large doses, in inflammation ; mercury, in laryngitis, iritis, ptyalism, lues venerea, &c. ; he proceeds to say :* “ Hahnemann’s general notion (although he has obviously at times a glimmering of the truth which is not easily reconcileable with this notion) is, that such substances operate in producing a stronger impression, and thus superseding the weaker ; but, this is nothing more than

* ‘ Elements of General Pathology.’

the old *σφοδρύτερος* axiom of Hippocrates. It is not in this way that homœopathic remedies operate, but, by stimulating to increased action the seat of the disease.

“ With respect to diarrhœa, piles, gonorrhœa, and catarrh of the bladder, diaphoresis, intermittent fever, laryngitis, iritis, ptyalism, and burns, the essence of all is inflammation ; and, how readily the same substance which at one time may produce, at another may cure it, will easily be perceived. It is unnecessary to speak of the action, in producing and curing the same diseases, of those substances which act *directly*, but let us take, as somewhat less obvious, that of some indirect agent in the same way, as that of mercury, one of the most generally admitted among the above-mentioned examples, in at one time producing and at another curing *iritis*. In the healthy state of the capillary vessels of the iris, their calibre is natural, because the stimuli, acting on their irritability, are neither deficient nor excessive ; but, the irritation produced on certain parts of the body by mercury is a new stimulus, specifically adapted to the irritability of these vessels (in common with those of many other organs), so that, conveyed to these by sympathy, it excites there a secondary inordinate irritation, or contraction, followed, sooner or later, by a proportionate collapse, in which the inflammation consists. Now, what substance should we *à priori*

conceive would be best adapted to bring up the vessels to their ordinary degree of contraction, and thus to discuss the inflammation? Any revulsive remedy (as we cannot get at the part directly) may be presumed capable of doing this, to a greater or less degree; but, unquestionably, *that* will be most efficacious which has already evinced a specific power of exciting, in one part, such an irritation, as, conveyed by sympathy to the vessels of the iris, would excite them to inflammation, and which, as it produced, while they were healthy, a preternaturally increased action, followed of course by collapse, will, now that they are acting below par, bring this action to the healthy standard, from which they will have no tendency afterwards to recede. *Hahnemann is quite aware of this two-fold action of medicines; and it is to insure their primary, without fear of their secondary action, that he inculcates the expediency of giving them in inconceivably small doses. But, it is absurd to say, as he at the same time does, that medicines, in such doses, operate by producing a stronger impression than that produced by the disease. They cure it, not by the stronger, but by the opposite impression which they make; so that, homœopathic medicines, after all, operate on the antipathic principle.*"*

* Dr. Dudgeon ('Lectures on Homœopathy') after quoting the above remarks of Dr. Fletcher, proceeds to say: "I was

The foregoing examples do not exhaust the list of allopathic evidence, but they may serve to show that among men distinguished in the schools of philosophy there are many who, although not partisans of homœopathy, have demonstrated the possible and even necessary action of unmeasurable doses, in accordance with the principles of science. In this sense, the admissions of Taylor, Watson, Barker, Pereira, and Addison, are as conclusive as the more direct theorization of Hufeland, Trousseau, Daubeny, Döppler, Virchow, and Fletcher.

The celebrated surgeon and physiologist, Mr. much gratified to observe in an essay by Dr. Clotar Müller, of Leipzig ('Allg. Hom. Ztg.,' xxix, 49), that he takes a very similar view of the curative process to that I have just given. He takes the inflammatory process as his theme of illustration, and after showing that inflammation consists of a kind of partial paralysis of the nerves of the capillaries, he asserts that the medicine cures by the stimulation it applies to these paralysed nerves, by virtue of its primary action; that its action, in fact, is the opposite of the actual condition of the diseased part, and that the principle *similia similibus* is merely our guide to the selection of a remedy, but that it by no means expresses the part that remedy performs in relation to the disease.

"*Apropos* of this explanation, I may mention a remark of John Hunter's, which is strikingly corroborative of these views: 'If,' says he, 'we had medicines which were endowed with the power of making the capillary vessels contract, such I apprehend would be the proper medicines in inflammation;' and such, undoubtedly, are our homœopathic medicines in their primary action."

Lawrence, tells us, that although we cannot point out the *modus operandi* of a medicine, we are not, on that account, to withdraw our confidence in its power. "It is enough," he remarks, "for us, in medical science, to know that certain effects take place :"* and, but for the earnest hope of escaping the opprobrium of quackery, and of meeting his allopathic brethren upon some common ground, the homœopathist might well leave all theories and speculations alone, and content himself with "the effects which take place," after the administration of his remedies. He feels, however, that his system is one of truth, and that experiment alone is necessary to demonstrate this, even to his most bitter opponents; therefore, he endeavours to show, by a reference to authorities of the allopathic school, that so to test the doctrine of infinitesimals, is neither absurd nor unscientific.

* Lect. on Surg., 'Lond. Med. Gaz.,' vol. v, p. 769.

CHAPTER V.

A CONVICTION of the dangerous effects upon the organism, of large doses of drugs, as well as of the often lasting injury of an incited drug affection, has frequently driven men of thought either into indolent and pernicious *expectancy*, or into the adoption of strange methods of seeking the curative, apart from the poisonous action of remedies. From the earliest dawn of so-called scientific physic down to the present day, we can trace such shifts. Hippocrates recommended that the nurse should be first subjected to medical treatment, that her milk might influence the child;* and Pliny relates† that the physician Democrates, having to treat Considia, the daughter of M. Servilius the Consul, who set herself against all severe medication, caused her, for some time, and with success, to use the milk of goats, fed with mastich.

In the twelfth century, Bernard le Provincial, a

* Third book of the 'Epidemics.'

† 'Nat. Hist.' lib. xxiv.

pupil of Salernus, published a treatise on dietetics, in which he gave a number of recipes, some of which are certainly curious examples of attempts to supply the desideratum of mild, attenuated medication. Aperients were to be prepared by introducing, in spring, certain laxative drugs underneath the bark of the plum-tree, or of the vine, so that the fruit, also, might be laxative.

The celebrated Salernus was in the habit of administering to his patients the flesh of animals that had been fed upon medicinal substances.*

In the eighteenth century, Bielke, member of the Imperial Academy of Stockholm, proposed to render the milk of the cow specific against scurvy, by causing the animal to eat such herbs as dandelion, and scurvy-grass.†

To come to the present day : we are told by Dr. Locock, that a patient of Mr. Keate's took mercury,

* M. Charles Ravel, in his excellent paper ("Les doses infinitesimals, &c." in 'L'Art Médical'), quotes the following curious passage from a report by M. Percy, published in 'Journ. Complément du Dict. des Sc. Méd.:' "Some persons have conceived the idea of causing certain animals to swallow portions of gold, and then making their patients eat their flesh ; they pretend that capons, fed with the flesh of vipers, and with particles of gold, can cure the most desperate maladies. *Louis XI tried this singular method, but he did not find it better than blood drawn from young children, which Coytier (his physician) caused him to drink.*"

† 'Essay on Milk,' by Petit-Radel, 1786.

by giving the nitrate to an ass, and drinking the milk.*

Two or three years ago M. Labourdette laid before the French Academy of Medicine a report of his experiments on the administration of medicine, through the milk of animals.† Not only was M. Labourdette's report received favorably, but M. Chatin even suggested, as an improvement, that the experiments would be best carried on by causing animals to feed on vegetables which, first of all, had been made to absorb medicinal substances. On that occasion, M. Trousseau said: "We are daily submitting nurses to a mercurial treatment, intended to act upon infected infants; and, although the quantities given to these women are not to be compared with those which these animals were made to take (in Labourdette's experiments), it is no less true that the health of the nursling becomes re-established." At the same *séance* of the Academy, also, M. Bouley remarked, that "however seductive, physiologically, the plan may be, it would be impracticable. M. Labourdette had already expended 40,000 francs, in his experiments; and his proposed preliminary vegetable assimilation would require the cultivation of large grounds, and watering them with a very expensive fluid."

* 'Cyclop. Pract. Med.' art. "Lactation."

† 'Bulletin de l'Academie,' tome xxiv.

There is not one word, in all this, about the absurdity of such infinitesimalized medicine. True, indeed, is the old saying,—“One man may steal a horse, while another may not even look over the hedge.” M. Labourdette’s communication was received by his learned colleagues with all respect; and the ‘Medical Times’ (1859), under the head of “Progress of Medical Science,” reports the proceedings of the Academy with a believing trustfulness in medical progress, which is truly refreshing. Even the proposition that the medicine should be *first* given to the plant, before it becomes food for the animal, in whose blood-vessels and udder the attenuation was to be completed, was not considered too bad. Yet, the truly scientific method of successive triturations, invented by Hahnemann, by means of which the most insoluble substances—many of which are rich in curative power, but which, in their cruder states, no animal could digest or absorb—are reduced to a condition, fitting them for a passage through the minutest capillaries, is scouted as ridiculous quackery.*

* The changes of opinion and of practice among allopathists on the subject of dose, and their evident anxiety to hit upon some method of mild medication, and more especially the recent homily of the ‘Lancet’ on non-perturbative doses, should cause homœopathists to look well after the reputation of their founder. They must not forget that Pronomus became so skillful a player on the lute, that at length he obtained the credit of having invented that instrument.

CHAPTER VI.

I SHALL now endeavour to answer the objection to the scientific status of infinitesimals, by an appeal to the evidence afforded by certain natural phenomena.

Unmeasurable quantities of attenuated, invisible substances, are ever revealing their mighty power over the human organism, as *poisons*, as *prophylactics*, and as *therapeutic agents*.

1. *As poisons*.—The contagion-atom of disease, the inappreciable miasm, the touch of a carrion-fly, the odour of a plant, the invisible pollen wafted from a hay-field, exhibit each the deadly force of infinitesimal portions of matter; nor must we forget that the saliva of rabies, the lymph of smallpox, or of cowpox, the poisons of the viper, or of the bee, are perfectly indifferent to the tests of the chemist.

The influence, however, of such subtle agents as miasmata, contagion-particles, and poisonous odours, depends greatly upon the responsive susceptibility of the organism to which they are offered. In fact, not only in a therapeutic, but also in a poisonous sense, there must be a certain affinity between the state of the organism and the specific stimulant,

whatever that may be, *provided it be infinitesimal*. Virchow, whom I have quoted elsewhere, observes : “If it be now said that provided such infinitesimal doses produced any effect, men would be every moment exposed to disease, in consequence of the medicinal potencies contained in the atmosphere, in the water, &c., the fact is overlooked, that the small dose is only effective when there exists the necessary specific affinity between the organism and the remedy. If this is wanting, no effect takes place. This is the reason why, in the midst of the most subtile and dangerous potencies (I mean miasm and other contagious diseases), those persons are first attacked who have a specific susceptibility for them ; whilst others, in whom this predisposition does not exist, escape with impunity, though equally exposed.”

The great susceptibility of the organism in some states, may be seen in the records of the case of Casper Hauser : “The light of day was, at first, insupportable, inflamed his eyes, and brought on spasms. Substances, the odour of which could not be perceived by others, produced severe effects upon him. The smell of a glass of wine, even at a distance, occasioned headache ; of fresh meat, sickness, &c. ; and of flowers, painful sensations.” Sir James Clark* remarks that the inhabitants of Rome, especially the

* ‘The Sanative Influence of Climate.’

females, are influenced remarkably by perfumes. In them, headache and numerous other nervous affections are readily produced by the agreeable odour of flowers and other perfumes. Orfila, also,* has given several instances of supposed poisoning by the odours of plants.

Dr. Pereira says of ipecacuanha that, "in some cases, the mere odour of the root seems sufficient to excite difficulty of breathing, with a feeling of suffocation." Dr. Elliotson† relates a case where a person of great susceptibility was incommoded by the presence of a box of ipecacuanha lozenges in a table-drawer.

Referring to the causes of spasmodic asthma, Dr. Elliotson also gives some curious instances of the influence of minute portions of matter in producing disease. "Some," he remarks,‡ "are affected by the emanations of an animal. Shakespeare alludes to some men who cannot bear a gaping (squeaking) pig; and some cannot bear a cat; they are made miserable if a cat be near them. It does not produce asthma, but the emanation from a cat has such an effect upon them that they are quite wretched. Mr. Poyser (of Wirksworth) states that the son of a lady who had

* 'Traité de Toxicologie,' vol. ii, p. 543.

† 'Principles and Practice of Medicine.

‡ Ibid.

hay-asthma, is made asthmatic by the smell of guinea-pigs. When he is in a room where they are, he is immediately seized with difficulty of breathing. I have a note from a gentleman in which he informs me that a nobleman with whom he is acquainted, is affected by sneezing and asthmatic affections, by coming in contact with a hare, or rather the *fur* of a hare, and remains ill for several days afterwards. He experiences great suffering whether the hare be dead or alive."

The same physician also quotes the following passage from a letter, addressed to him by Dr. King. "I dined lately in company with a lady, who went into convulsions as soon as a plate was set before her, owing to its containing some peas, which had been boiled, or dressed, with mint."

The celebrated Laennec relates the following case: "Count H—, a man of robust constitution, and although now eighty-two years of age, still possessed of a degree of vigour unusual even at the age of sixty, has been subject from his infancy to attacks of asthma, and is habitually somewhat short-breathed. Since his fiftieth year, he has had a slight cough, and in the morning a pituitous expectoration, intermixed occasionally with some yellow sputa. The asthmatic attacks have always been unfrequent with him, but they have invariably come on if any person has in-

advertently shut his bedroom door, or if his night-lamp has by chance gone out. As soon as either of these accidents occurs, he immediately awakes with a feeling of oppressive suffocation, and after a few minutes he becomes insensible. On the occasions alluded to, the attack is got rid of by opening the doors and windows, lighting the candles, and carrying the patient into the open air." This condition of the patient may be caused by the smell of the extinguished lamp; and perhaps by the emanations from his own body, the smell of his own perspiration.

If infinitesimal, inappreciable portions of matter floating in the atmosphere, can thus produce disease, why may not quantities, equally minute, have a therapeutic power? Susceptibility of the organism, or in other words, affinity for the poison, is necessary to the full development of its activity; so, also, an affinity between the morbid organism and the remedy must be present to secure a therapeutic result. It is this affinity between the disease and the remedy—this receptivity of the system, increased by its morbid condition, which renders it possible that doses so unmeasurable should have a curative effect.

2. *As prophylactics*.—After describing an experiment in which they were able to render visible less than the millionth of a millegramme* of chloride of

* A millegramme = 0.015432 of an English grain.

sodium, floating in the air, Kirchoff and Bunsen thus record their belief in the prophylactic or antiseptic powers of infinitesimal proportions of matter.*

“More than two thirds of the earth’s surface is covered with a solution of chloride of sodium, fine particles of which are being continually carried into the air by the action of the waves. These particles of sea water, thus sent into the atmosphere, evaporate, leaving almost inconceivably small residues, which, floating about, are almost always present in the air, and are rendered evident to our sight in the sunbeam. These minute particles, perhaps, serve to supply the smaller organised bodies with the salt which the larger animals and plants obtain from the ground. In another point of view, however, the presence of this chloride of sodium in the air is of interest. If, as is scarcely doubtful at the present time, the explanation of the spread of contagious disease is to be sought for in some peculiar counter-action, it is possible that the presence of so antiseptic a substance as chloride of sodium, even in almost *infinitely small quantities*, may not be without influence upon such occurrences in the atmosphere.”

At the meeting of the British Association at Newcastle, Dr. Robertson read two papers; one “*On the Nature and Varieties of Organic Effluvia* ;” and the

* ‘Phil. Trans.’

other, "*On the Practicability of arresting the Development of Epidemic Diseases by the use of Anti-zymotic Agents.*" In the first paper, he argued that the atmosphere is full of invisible organic germs, which, entering the blood, are the causes of epidemic diseases. In his second paper, he proposed the use of anti-zymotic agents, such as arsenic, &c., to counteract the disease-producing force of these germs. As a comment upon Dr. Robertson's second paper, the Rev. J. E. Elden stated that some of the medical men of Birmingham attributed the remarkable freedom of that town from cholera, to the minute quantity of arsenic which, no doubt, was present in the air, and which was given off from the neighbouring metal works.

Another instance of the prophylactic power of infinitesimals was mentioned the other day, in the French Academy. In a debate on "drinkable waters," M. Chatin referred to the connection of goître and cretinism with the nature of the waters used by the inhabitants of different localities; and described the geographical peculiarities of bronchocele, which displays an unvarying dependence of the number of cases of goître, upon the chemical constitution of the waters, and especially on the presence or absence of iodine as an ingredient. He also adduced the remarkable fact, that the inhabitants of the Valais,

amongst whom goître and cretinism are notoriously prevalent, use almost exclusively the pure waters of the glaciers, free from organic matter; whereas, on the contrary, inhabitants of turfy valleys, drinking water laden with organic deposits, enjoy entire freedom from bronchocele. "Hence," remarks M. Chatin, "the best, the only preventive treatment of goître is to use water naturally or artificially iodized."*

Mineral waters, and even those called iodine-waters, contain only infinitesimal proportions of that element; and in many districts where bronchocele is unknown, or very rare—a condition, according to M. Chatin, dependent on the presence of iodine—that substance cannot be detected either in the air or water, although it *may* exist, and no doubt *does* exist in inappreciable quantities.

The propositions laid down by Dr. Robertson, and by M. Chatin, are full of interest. From the cradle to the grave, man dwells amidst an invisible, but never-ceasing contest between the powers of life and death; and the very air he breathes teems with living germs, which are ever seeking an affinitive organism in which to ripen into disease.†

* 'Journ. Pract. Med. and Surg.'

† Πλείη μὲν γὰρ γὰτα κακῶν, πλείη δὲ θάλασσα,
Νοῦσοι δ' ἀνθρῶποισι ἐφ' ἡμέρη, ἢ ὕ' ἐπὶ νυκτι
Αὐτόματοι φοιτῶσι.—*Heriod.*

On the other hand, science has bestowed upon man the pleasing knowledge that, in the air around him, and in the water at his feet, nature has distributed her invisible, infinitesimal prophylactics; that the unmeasurable and unsuspected portion of iodine in air, or water, or food, repels the grasp of goitre from the throat of beauty, and that the infinitely small quantity of sea-salt dispersed through the atmosphere, has probably an influence that may retard the onward march of an epidemic. So, also, although from the mighty operations of civilization, new health-destroying influences may arise, and fresh battalions of diseases may invade the earth;* yet it is more than probable that the very labours of man himself may produce, often unsuspected by him, a sufficient antidotal force.

* ———nova februm,

Terris incubat cohors. HOR. lib. i, od. 3.

CHAPTER VII.

I PASS on to a very important section of my subject, viz., the consideration of the existence of certain natural infinitesimals which act—

3rd, *As therapeutic agents.*

Although natural infinitesimals, both in their poisonous and in their prophylactic aspects, are, as far as power and quantity are concerned, *apt analogues of homœopathic preparations*, yet, it is in their curative sense, and as they exist in mineral waters, that the true analogy between natural and artificial unmeasurable doses is to be found.

In the 'British and Foreign Medico-Chirurgical Review,' of July last, Dr. Semple gave an excellent epitome of the *leçon d'ouverture* of a course on mineral waters, delivered at the Ecole Pratique, by Dr. Durand-Fardel.* The *leçon d'ouverture* was originally published in the French Medical journal, 'L'Union Médicale.' The following is Dr. Semple's epitome :

* Médecin inspecteur des sources d'Hauterive, à Vichy, Secrétaire Général de la Société d'Hydrologie Médicale, à Paris.

“Dr. Durand-Fardel explains, in general terms, the value of mineral waters in the treatment of disease. He regards as mineral waters all those natural waters which, by reason of their composition or their temperature, are employed with a therapeutic object. All spring and river waters are mineralized, and sometimes to as great a degree as some mineral waters endowed with powerful properties.

“Dr. Fardel places thermality in juxtaposition with mineralization, because there are some waters which would, unquestionably, lose a part of their therapeutic value if they were deprived of their thermality.

“During the last twenty years, iodine and arsenic have been found in a great number of mineral waters in which they had not previously been recognised; and, later still, the new method of spectrum-analysis has revealed the presence of metals, the existence of which was formerly unknown.

“It is not ascertained under what form chemical bodies exist in mineral waters; for although iron, arsenic, iodine, soda, and carbonic acid, obtained from mineral waters, are the same substances as those which are extracted from the soil and the atmosphere, yet they do not exist under the same conditions as in the inorganic compounds treated, or created, in the laboratory.

“It must, also, be observed that mineral waters

present, in a state of solution, principles which to the chemist are perfectly insoluble :—

“That they are penetrated by gases, in proportions which are almost inconceivable; that they contain organic matters, the true characters and origin of which are unknown; that some of the principles manifest a physiological and therapeutical action, in doses which are inert in other media; that they secure a tolerance of principles which could not be administered with impunity in similar proportions; and lastly, that waters scarcely mineralized, as those of Mont-Dore, Plombières, Nèris, and many others, exercise an action on the organism which could not be expected from their known chemical composition.”

These remarks, from a man of great experience—a teacher in the schools of orthodox medicine, are most significant. Indeed, almost every sentence contains a reference to phenomena which indicate the operation of the homœopathic law, and point to the surprising influence of infinitesimal portions of matter on the human organism.

Dr. Semple omits one sentence in the lecture, which I must supply.

Dr. Fardel having hinted at the speculations of some who have ascribed to mineral waters—organization, and life, and soul—then proceeds to say: “You may replace these hyperboles by theories of the

extreme compression undergone by the waters in the bosom of the earth ; by infinite division ; by electricity ; by the phenomena of catalysis ; or you may simply confess your ignorance."

Extreme compression! infinite division! electricity! phenomena of catalysis! as if he had said: "It is indisputable that, in mineral waters, infinitely small proportions of matter have a therapeutic power—this is the fact—seek for yourselves a theory of interpretation."

The concessions of a man like Durand-Fardel will not be without fruit. It is only about a fortnight since I had the opportunity of seeing a report of his lecture; but, before that time I had noted down, for the purpose of bringing them before the Society, the following propositions, which I am now able to support by a reference to Fardel, among my other authorities.*

That certain mineral waters owe their therapeutic virtues to substances *analogous with the preparations of the homœopathic pharmacy* I believe, and for the following reasons:—

1st. Aggravation of the disease-symptoms frequently accompanies the use of the waters.

* My authorities throughout, it will be seen, are principally of the allopathic school. I purposely avoid allusion to homœopathic writers.

The mere fact of the aggravation of a disease, is not a proof of the homœopathicity of a medicinal agent. All drugs, in the ordinary doses of the schools, and given without any reference to the law of *similars*, may, under certain circumstances, increase, by the violence of their action, the diseased state of the organism ; but, the aggravation to which I allude now, in connection with the use of mineral waters, is the result of the influence of matters, too minute in quantity, to have any violent effect upon the system.

That aggravation of disease-symptoms by mineral waters is not a rare occurrence, may be shown by a reference to allopathic writers ; thus, Patissier observes :*

“The treatment of chronic diseases succeeds so much the better in proportion as the medication employed is more mild and gradual ; and mineral waters are, of all the resources of medicine, unquestionably the best means of effecting this medication. They act, sometimes, by modifying the humours, as the Vichy waters, sometimes *by inducing a slightly acute state*, which rouses the torpid organs, increases the secretions, and favours salutary crises. When the excitation is slow, and moderate, it relieves and removes obstinate diseases ; but, when it is too strong,

* ‘Manuel des Eaux Minerales.’

it exasperates them, brings into activity latent inflammations, and hastens the progress of organic disorganization."

Dr. Lee observes:* "In some instances, an increase of former pains, eruptions, and feverish symptoms, are induced; though these are exceptional cases as regards the majority of the waters, and, sometimes, depend upon their improper use."

Dr. Van Ammon† remarks: "Mineral waters can only produce their beneficial effects in a slow and gradual manner. A hurried, perturbatory employment of them not only prevents the cure, but almost always causes an aggravation of the disease."

If we recall Dr. Fletcher's remarks upon the primary and secondary action of specific medicines, we shall be able, at once, to perceive the possibility of a constituent of a mineral water, homœopathic to the disease, having the power of aggravating its intensity.

According to Dr. Fletcher, it was to secure the *primary* action, alone, of medicines, that Hahnemann instituted the infinitesimal dose; but, in highly susceptible organisms, even the continued use of such small doses has been known to produce medicinal aggravation—the secondary effect of the remedy.

* 'Mineral Waters,' p. 65.

† 'Brunnen Diätetik.'

2nd. Instances are not rare, of mineral waters actually setting up, in the previously healthy organism, symptoms resembling those for which they are celebrated as remedies. The experience of almost every medical man, conversant with mineral waters, will confirm this assertion.

"Dr. Andrieu mentions the case of a lady and her two daughters, who were simultaneously attacked with affections resembling typhoid fever, after having drank too freely of the waters of Barèges. He also speaks of a robust man who was seized with an attack of bronchitis, from the abuse of the waters of Barèges and Caunterets."*

3rd. The therapeutic action of some waters differs essentially from the known physiological effects of their prominent ingredients.

"Waters scarcely mineralized," remarks Durand-Fardel, "as those of Mont-Dore, Plombières, Nèris, and many others, exercise an action on the organism which could not be expected from their known chemical constitution."

"The therapeutical action of a spring," writes Dr. Lee,† "is not always of the kind which an investiga-

* 'Conferences upon Homœopathy,' by Dr. Granier.

† 'Mineral Waters.'

tion of its chemical composition would lead one to suppose."

"It is evident to us," observes Patissier, "that the medicinal action of natural mineral waters is not always in relation with what we know of their constituent principles; it is not a few grains, more or less, of mineralizing salts which determine the salutary effect of mineral waters; chemistry teaches us to characterise, to class the waters, shows us the analogies which exist between them, enables us to anticipate some of their properties, by showing us the predominating mineral ingredients; but it belongs to *clinical observation*, to the authority of multiplied facts, to determine the therapeutic action."

Speaking particularly of the Buxton waters, Mr. Page says:* "In that state of weakness and irritability which so generally attend the subsidence of febrile and inflammatory affections, but, more especially, in the protracted stages of gout and rheumatism; in many nervous disorders, such as epilepsy, paralysis, St. Vitus's dance, palpitation of the heart, tic douloureux, &c.; as in many anomalous complaints, originating or complicated with a disordered state of the digestive organs, a judicious employment of the Buxton waters will frequently be attended with

* 'Manuel des Eaux Minerales.'

† 'Treatise on the Buxton Waters.'

the happiest effects, *and this, too, in spite of chemical analysis, and the opinion of those persons who affect to doubt their virtues*, because neither they nor their chemical friends have been able to discover the ingredients on which such virtues should depend."

"Here, at Buxton," writes Dr. Granville,* "we have a water, at nearly the same degree of heat as that of Schlangenbad, with *fewer ingredients, still producing not only similar, but even more energetic effects.*"

If we find, on the evidence of enlightened observers of all schools, that a mineral water exercises a therapeutic action, not indicated by its constituents, we may justly infer that some other active ingredient is present; and this may be some substance hitherto unknown to the chemist; or, some well-known body, existing, however, in infinitesimal, undetectable quantities; for if we regard the history of chemical, and physical research, during the past few years, we shall see how improbable it is that any *known* substance should exist, in water, in *material* or *ponderable* quantities, or even in traces, and yet escape all the tests of the physicist.

In the absence, however, of physical signs of the existence of a sufficient therapeutic agent, we have a right to determine its presence, or absence, by *physiological evidence*. If Adams and Leverrier—*si parva*

* 'Spas of England.'

licet componere magnis—were justified, on scientific principles, in ascribing the perturbation in the orbit of Uranus to the proximity of some unknown, some undiscovered planet, so after noting the uniform and constant *physiological effects* of some mineral waters—effects at variance with the characteristics of their appreciable constituents—may we claim the right to ascribe their action on the organism, to some undetected infinitesimal ingredient.

By means of the physiological test, not only may the presence of an active yet infinitesimal remedy be determined, but sometimes it is possible to name the exact substance, from an observation of its behaviour in the system. Before the discovery of iodine in the old well at Cheltenham, its waters had long been celebrated for their therapeutic powers, and for physiological results which could not be traced to any of its known constituents. In that water, however, the iodine exists in quantities which may be termed infinitesimal, *i.e.*, one grain, in four millions and a quarter, of the solvent ; yet, Dr. Wilkinson, of Bath, long before the physicists detected that element, had assured himself of its presence, by the vital or physiological test.

In the debate on “drinkable waters,” in the French Academy, to which I have before alluded,—M. Grimaud observed :—“The assistance of chemistry

is here inestimable, although it does not supply us with all the knowledge desirable." In other words, it fails to detect, in the waters under examination, those substances whose physiological effects are evident. "Practically," continued M. Grimaud, "the properties of the organic, and inorganic ingredients, must be the object of consideration; and these are best evinced by the physical and moral characteristics of the mass of individuals who exclusively use for consumption the waters submitted for examination."

M. Grimaud's remarks evidently point to the superiority of that *vital test* which exhibits itself in the *physiological changes* produced in the frame by the organic or inorganic constituents of a water, but, of the action of which, chemistry "does not supply us with all the knowledge desirable."

When Durand-Fardel alludes, in his lecture, to the recent discovery of iodine and arsenic in mineral waters, and to the more recent revelation, by the spectroscope, of metals whose existence was formerly unknown, he admits, in effect, *the possible solution of the therapeutic secrets of some springs*, by the detection of bodies, so infinitesimal, as to have hitherto escaped all previous methods of research. This admission, on the part of Dr. Fardel, I consider to be of immense value as evidence in favour of the *scientific*

4th. In some springs, where the therapeutic agent *can* be detected, it exists, nevertheless, in quantities so minute, that the doses, obtained by the use of the waters, are infinitely smaller than those of the orthodox school ; and would, in fact, under other circumstances, be considered inert, according to the rules and experience of ordinary practice.

It is to this circumstance that Durand-Fardel alludes, when he asserts of mineral waters, that " some of their principles manifest a physiological, and therapeutic action, in doses, that would be inert in other media."

Dr. Gairdner, a well-known writer on mineral waters, observes: " In judging of the effects of a mineral water, it is important to discriminate what portion of these are to be ascribed to the water itself, what to the elevated temperature, in the case of thermal waters, and what to its foreign ingredients. The simple circumstance of dilution will, certainly, facilitate the operation of matters, which ought, otherwise, to pass little changed through the alimentary canal : and, from the extremely minute state of division in which the active parts are presented to the sentient mouths of the capillary absorbents, it is more than probable that they are directly absorbed into the circulating mass ; indeed, in no other way can we account for the powerful effects which result from the

use of many chalybeate springs. The strongest does not contain more than five grains of iron to the gallon of water; the real quantity of the tonic received at a single dose into the stomach, or contained in a pint of water, must therefore be exceedingly small, and nevertheless it will exert a more salutary effect upon the system than twenty times the dose of the artificial carbonates, in our ordinary prescriptions."

Another authority, Dr. Lee,* referring to the same subject says: "It has been questioned whether so small a fractional part of iodine, as compared with the quantity of salts, can be productive of any effect: but, several remedies which have considerable reputation, as burnt sponge, cod-liver oil, &c., of which the active principle is an ioduret, or hydriodate, of which the effects are well marked, do not contain this substance in greater proportions than would be taken in mineral waters, where, be it remembered, the state of dilution, and intimate admixture, conduce to its more complete absorption. M. Boujeau, a distinguished chemist in Savoy, drank a quart of the iodated water of Challes, in the course of a day, and, for seven days subsequently, both urine and saliva showed manifold signs of the presence of iodine;—whereas, five grains of iodide of potassium, which he took in water, exhibited traces of iodine in the urine,

* 'Mineral Waters.'

only during twenty-eight hours, and in the saliva, seventeen. The water of Challes, however, does not contain more than one third of a grain of iodated alkali to the quart.”*

The celebrated Thénard ascribes the curative properties of the Madeleine spring, at Mont d’Or, to the presence of arseniate of soda, although his analysis only gives 0.015432 of a grain, in 14,000 grains of the water.

The waters of Plombières only contain the thousandth part of a grain of arsenic in a quart; yet Turck, and others, ascribe the value of these springs to that mineral.

The waters of Vichy, Bussong, Provins, Pyrmon, Ems, and Wiesbaden, also contain arsenic; but in proportions so minute that it is only recently that the test of the physicist could grasp it; indeed, the tables of analyses of the springs of Wiesbaden, Ems, and Pyrmon, published by Dr. Lee, in his last edition of the ‘Baths of Germany,’† make no mention of it.

It is to the effects of trituration, and of attenuation resulting in perfect solution, I had almost said ‘*dy-*

* In this case, it is evident that the minute division and dilution of the salt, in the mineral water, gave to the third of a grain a greater amount of force than to the five grains of the artificial solution. Large, coarse doses are not so readily absorbed, as small well attenuated ones.

† Fourth Edition, 1863.

namization,’ that the wonderful effects of water, acting even allopathically, as in the case of saline springs, are to be traced. It is, no doubt, the same mechanical processes which have imparted a difference of character—probably in relation to the quantity of free electricity—to the usual ingredients of waters, to which allopathic writers refer; and it is the same operations of nature which have given to minute undetected ingredients, a power which, when exerted in a homœopathic direction, constitutes them *complete analogues* of the homœopathic preparations. It is the affinity between a morbid organism, and a highly triturated and perfectly dissolved medicine, which gives to the *infinitesimal* ingredients of mineral waters their curative value.

5th. In certain thermal waters, a fall of temperature is accompanied by a loss of therapeutic power.

I believe that in many instances the loss of therapeutic force, consequent upon the cooling of thermal waters, is owing to the *precipitation* in invisible proportions, of some active ingredient, which is soluble only at high temperatures.

Whatever may be the cause of the temperature of thermal springs—whether it be the existence of a central source of heat—the action of volcanic fires—or the decomposition of metallic sulphurets—one thing

is probable, viz., that the pressure of steam on the surface of the imprisoned water, together with an elevated temperature, give to that water a power of solution which, under other circumstances, it could not attain, “and thus, impregnated with healing forces, the hot bubbling fluid issues, for the benefit of mankind, an inanimate Hippocrates, a Galen untaught by art.”*

That the union of pressure and heat has an influence in promoting solution is well known; and M. K. Möller has recently recorded some of his experiments in this direction.† He tells us that he finds the solubility of chloride of sodium and of sulphate of potash considerably increased under pressure. Sulphate of lime also undergoes considerable influence as to solubility under similar circumstances. At 15° 100 parts of water dissolve 0·207 of gypsum, under a pressure of one atmosphere; and 0·250 under twenty atmospheres.

If a solution of sulphate of soda be placed in a receiver, one part of which is heated, while the other remains cold, the proportion of salt increases in the heated part at the expense of the cold part. The

* Οὕτω προηλθε πασι
Τὸ θερμόβλυστρον ρεῖθρον
Ἰπποκράτης ἀψυχός
Τεχνῆς ἀνευ Γαληνός.—*Paulus Silentarius.*

† ‘Bibliothèque Universelle de Genève.’

water has a greater affinity for the salt at a high temperature.*

M. Moëller remarks that as pressure, like heat, increases the affinity of water for certain salts, we may understand why the deeper water of the sea holds more solid matter in solution than the surface water does.

It is not improbable, then, that some perhaps hitherto undiscovered substance, soluble at high temperatures only, and taken up very likely in the first instance under the influences of heat and pressure, is rendered inert and insoluble, as the waters cool. Familiar—though from their partial solubility in cold water, not perfect—illustrations may be seen in the earth *strontia*, which at 60° requires for solution 160 parts of water—but is much more soluble in hot water; and, in cream of tartar, one part of which requires 80 parts of water at 60° to dissolve it—but only 7 parts at 212° .

It is not unlikely that some substance resembling silica, in its insolubility, may be the matter precipitated from a hot spring. Silica is considered by the chemist to be perfectly insoluble except as a gelatinous

* This is not so when pressure is absent; for, under ordinary circumstances, the solubility of sulphate of soda increases up to 93° , and from thence diminishes. At 93° 100 parts water dissolve 53 parts, and at 212° only 42 parts.

hydrate—yet it exists in water in another state—the result of trituration, or of great heat and pressure aided by trituration. The dried powder obtained from this condition of silica is not, like the dried hydrate, gritty between the teeth.

I may remark in this place, that it is not impossible that the substance lost during the cooling of a thermal water may have existed in the spring in a state of gas, or vapour. Nor is this inconsistent with its insolubility in cold water. According to Jeffreys, even silica itself, at very high temperatures, is carried off by steam in a state of vapour. So, also, the almost insoluble boracic acid is reduced to a state of vapour, and carried off with the steam which issues through the fissures of the earth near the volcanic lagoons of Tuscany.

If the loss of therapeutic power which accompanies a fall of temperature were only true of those waters which are employed as baths, we might ascribe the loss of curative virtue, partially at least, to the absence of that important hygienic agent *caloric*; but the same thing holds good when thermal waters are taken internally; nor do all thermal waters lose their power in cooling.* In many cases, however, as the waters

* Even when waters are employed as thermal baths, the absence of one active constituent may affect the value of the water; for whatever water will *dissolve*, the skin will *absorb*.

cool, their virtues depart ; and, unless we can ascribe peculiar properties to the thermality itself—we can only conclude that some invisible, imponderable ingredient, soluble at certain temperatures, is precipitated and rendered inert.

6th. Mineral waters hold in solution certain principles which the chemist finds to be, in his hands, perfectly insoluble.

This condition of mineral waters has already been partially discussed under the preceding heads. I shall return to it for a few moments.

This unwonted solubility of otherwise insoluble bodies is due mainly to the process of constant, incessant trituration, aided, no doubt, in the case of thermal waters, by heat and pressure. Deep, deep, within the dark fissures of the earth's crust—rolling, tumbling, grinding, age after age, the successive currents of water seek their way to an outlet ; and, in their passage, even the flint itself is ground up and dissolved.

The processes of successive triturations recommended by Hahnemann, in the preparation of the homœopathic remedies, represent on a small scale the vast operations of nature, by which the stubborn flint is subdued and dissolved ; and in this resemblance con-

sists one great claim of the infinitesimal medicine of Hahnemann to a scientific standing.

The allusion to the solution of flint in mineral waters, recalls a passage in one of Dr. Lee's works, which is strongly indicative of the ignorance of the old school on the subject of the physiological powers of certain substances. He is referring to Dr. Struve's plan of manufacturing artificial mineral waters, and he says: "Distilled water is used, and the best analyses are so closely followed, that even the minute portions of *inert* substances, such as *silica*, are not omitted;" and he then quotes the following remark of Dr. Struve: "In a mineral spring, no constituent part is indifferent, and the smallest has its share in the general action, although it may itself apparently possess no power." *

From a careful study of the pathogenesis of silica, as recorded in Jahr, I have but little doubt that many of our mineral springs owe much of their virtue to this *quasi inert* substance. At any rate, the analogy between our artificially prepared medicines and those which exist in natural waters, is rendered more striking and apparent by the fact that both the pharmacal and the natural processes tend to the same result,—the conversion of an *insoluble, inert body*, into

* 'Mineral Waters.'

a remedy, whose curative power is manifested in even infinitesimal proportions.*

* Silica exists free in mineral waters in two conditions; *first*, as a gelatinous hydrate; and, *secondly*, in the form of perfect solution, resulting from extreme attenuation from trituration or vaporization. It is in the latter condition that it exercises its therapeutic powers. The gelatinous hydrate, when dried, forms a powder which is gritty between the teeth, and therefore is not sufficiently comminuted to act in infinitesimal proportions; while the other is perfectly smooth and impalpable.

CHAPTER VIII.

DR. DURAND-FARDEL observes, that "it is not ascertained under what form chemical bodies exist in mineral waters ; for, although iron, arsenic, iodine, soda, and carbonic acid, obtained from mineral waters, are the same substances as those which are extracted from the soil and the atmosphere, yet they do not exist under the same condition as in the inorganic compounds, treated or created in the laboratory."

In this observation Dr. Fardel evidently regards the difference merely between the physiological behaviour of the ingredients of mineral waters, and those found elsewhere. That they are equally responsive with the others to the tests of the chemist, is not denied ; but, in their action on the human organism, they present aspects which the mere crude drugs of the same name never assume.

This difference arises from the following causes :

1st. The trituration to which the ingredients of a mineral water have been subjected, so that their physical structure is altered, and they are rendered more easily fitted for traversing the capillaries.

2nd. The homœopathicity of the action of the infinitesimal ingredients. The *curative* effect of slightly mineralized waters must, from the smallness of the dose, be in the homœopathic direction; hence, the activity of the therapeutic constituent is called forth, or increased, by the susceptibility of a diseased organism; and a force is developed which is never found in crude drugs.

These properties, easily understood by the homœopathist, and which the ingredients of a mineral water possess in common with their analogues, the preparations of the homœopathic pharmacy, have induced those who disbelieve the law of *similars*, to ascribe to them, erroneously, a difference of constitution.

Not only does this potentization of medicines by trituration cause a marked difference between the action of the constituents of mineral waters, and the same compound, when formed in the laboratory, but also between the medicine of homœopathy and the same substance, chemically speaking, when taken in our ordinary food or drink, or breathed in the atmosphere around us. The common salt of the dinner-table, and the *natrum muriaticum* of the homœopathist are *chemically* the same, but *physiologically* they are not. The one, in its crude state, performs alone its office as a condiment; and in the process of digestion, and assimilation, is decomposed and changed;

while that which is triturated or potentized, is removed beyond the reach of chemical interference and decomposition, and is fitted for an immediate entrance into the circulation. In the two conditions of this well-known compound, to which I have referred, we have an example of the kind of difference which exists between the iron, or arsenic, or iodine, or soda, of the laboratory, and of the mineral water.

It may be objected that mineral waters often contain a number of ingredients, *all* equally potentized by trituration, some even antidotal of the others; how is it then that the one medicine can, under such circumstances, perform its functions?

To this it may be replied,—the curative power of a medicinal substance, homœopathically selected, is necessarily higher than the mere antidotal force of any interfering body. The medicine owes its therapeutic power to the receptivity of the diseased organism, to which it happens to be homœopathic; no two drugs have an equal pathogenesis throughout, and therefore the antidote or the interfering body, under no circumstances, can exercise a power over the disease equal to that of the true homœopathic remedy. The medicine is aided, too, in its operation, by the vital force of a diseased and highly receptive organism. As in obedience to the law of affinity, potassium would resist the influence of all other elements

